California Energy Commission

"Making Renewables Part Of An Affordable And Diverse Electricity System In California"

Stratagies in Solar-Electric Building

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Public Interest Energy Research (PIER) Renewables Photovoltaics

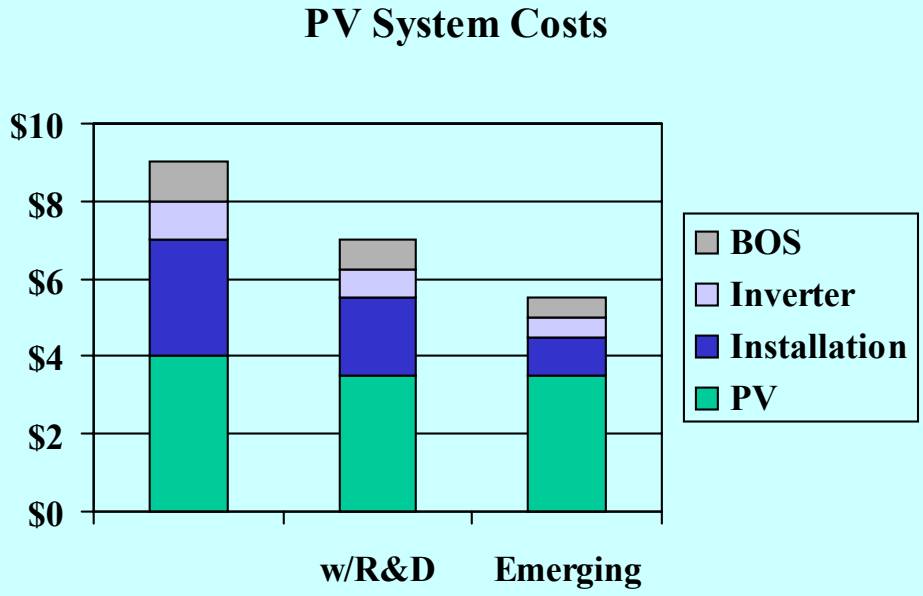
- RD&D Optimizing Cost / Value of systems
- Powerlight, Commonwealth, Endecon, REDI and SMUD
- BIPV Justification, DG, PV:Bonus, new Solicitation?

Cost / Value of PV

Cost:

PV Module + Installation + Inverter + BOS

=System Cost



Value:

- **~1,800 kWh / year per kW installed PV**
- **Peak shaving**
- **Reliability**
- **Quality, and more….**

Additional BIPV Value:

- **Shading value**
- **Building Material Credit**
- **Net Metered Retail Value**
- **Aesthetic value and more...**

19 SMUD Projects

PROJECT LIST FOR ASSESSING AND TARGETING RENEWABLE ELECTRICITY DEVELOPMENT

Project 1.1 *Technology Assessment for Advanced Biomass Power Generation – UCD*
Project 1.2 *Photovoltaic Markets and Technologies – Solar Electric power Assoc.*
Project 1.3 *Utility System Capacity and Customer Demand Value of PV – NREL*
Project 1.4 *Performance Indexing of PV Systems – TBD*
Project 1.5 *Assessment of Worst-Case Weather Conditions – TBD*

PROJECT LIST FOR INCREASING AFFORDABILITY BY IMPROVING EXISTING FACILITIES

Project 2.1 *Accelerated Anaerobic Composing for Energy Generation – Yolo County Landfill*

PROJECT LIST FOR EXPANDING AFFORDABILITY AND DIVERSITY USING RENEWABLE DISTRIBUTED TECHNOLOGIES

Project 3.1 *Laminate & Batten Roofing System – Uni-Solar*
Project 3.2 *BIPV Mounting Approaches for New Construction – Schott Applied Science*
Project 3.3 *Mainstreaming PV for Residential Roofs – Power Light*
Project 3.4 *Flat Roof Mounting Approaches – Schott Applied Power*
Project 3.5 *Optimization of Residential PV Systems – Astro Power*
Project 3.6 *Remote Dispatch & PV Irrigation – TBD*
Project 3.7 *PV & Evaporative Cooling – Jenrus Corp.*
Project 3.8 *Solar Dish Concentrating with Stirling Engine - SAIC*

PROJECT LIST FOR DEVELOPING RENEWABLE TECHNOLOGIES FOR TOMORROW'S ELECTRICITY SYSTEM

Project 4.1 *Non-Vacuum Thin-Film CIGS Modules - Unisun*
Project 4.2 *Maximum Power Point Tracker Inverter Development - SMA*
Project 4.3 *Hybrid PV/Lighting System – Oak Ridge Nat. Lab*
Project 4.4 *Slat Array Concentrator – Sergei Vasylyev*
Project 4.5 *Distributed Generation Geartrain for Megawatt Turbines – Dehl*

The Beauty of the SMUD Award for PV

- Resource assessment, BIPV systems development, CSP, module manufacturing, quantification of performance and value, and connecting to the market are the path to making PV more affordable in California.
- The technology developers, SMUD and the CEC all have a vested interest for success of these PV RD&D projects.

For Non-Building Integrated PV installations:

- **Land needs to be purchased**
- **Permits needs to be pulled**
- **Land needs clearing**
- **Mounting structures need to be erected**

- **Holes needs to be dug**
- **Concrete needs to be poured**

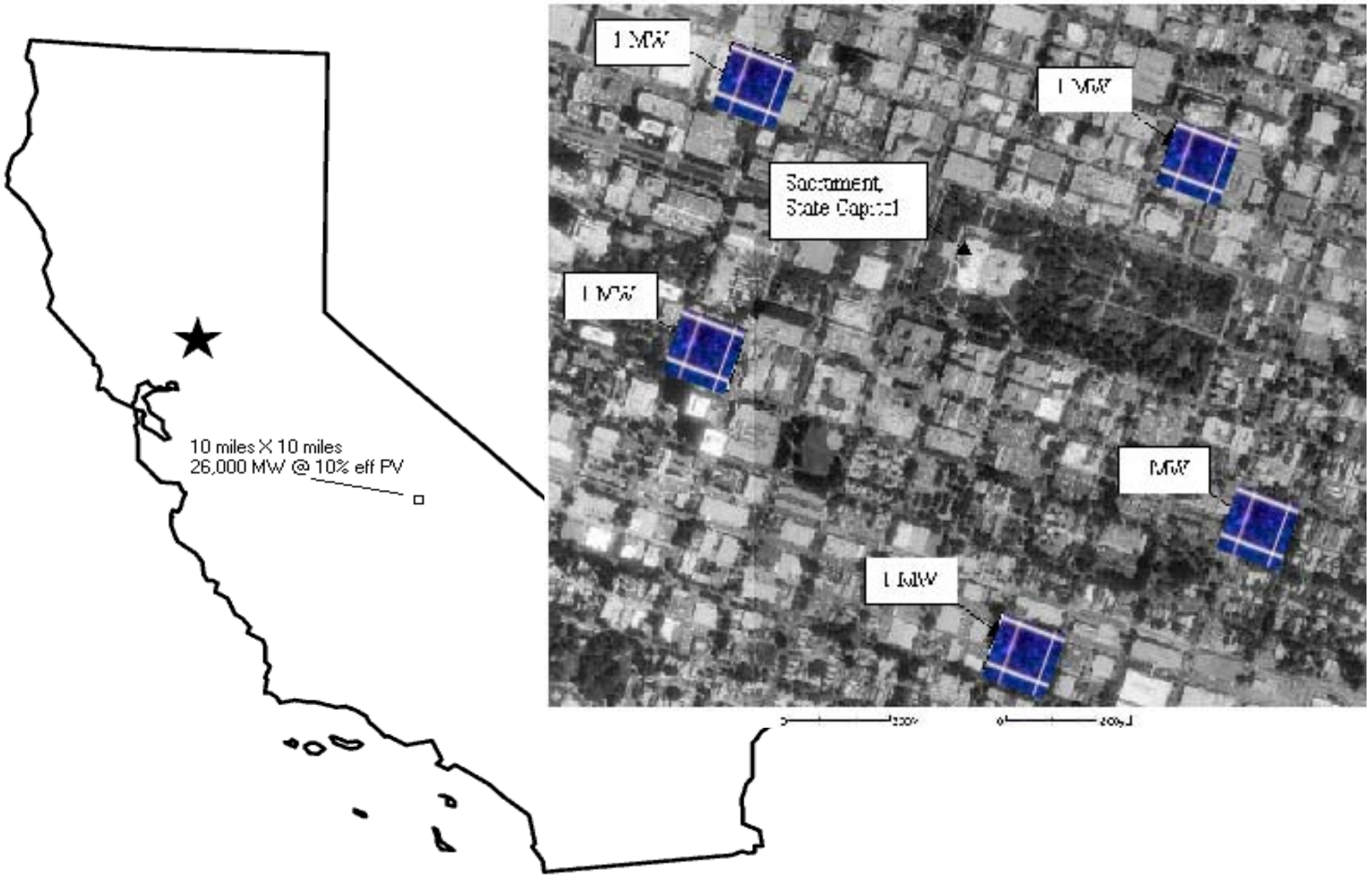
- **Electrical lines need to be strung in conduit**
- **Connections to the existing utility are needed**
- **Transformers and switching gear are needed**
- **A fence is needed**

Notice the Photovoltaics isn't even mentioned yet!

BIPV makes economic sense

- With a building you have already:
- Purchased the land
- Paid for permits
- Have electrical equipment
- Don't need a fence around equipment.
- <u>Most importantly</u>, with net metering, you get the retail value of the electricity produced!

DG Potential of PV on Buildings



Successful PV:Bonus Projects

Figure 3. AC PV modules

Figure 4. Architectural PV glazing system

Figure 4: Prototype Phototherm product adjacent to thermal-only collector on test.

Figure 5. PV-integrated modular homes

Figure 6. Rooftop PV systems

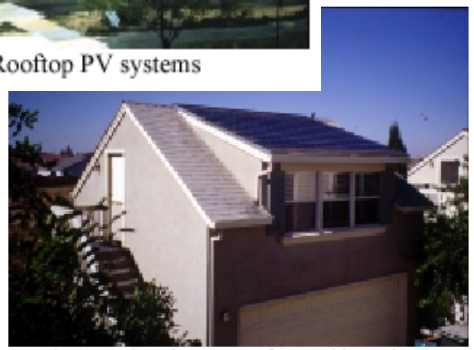
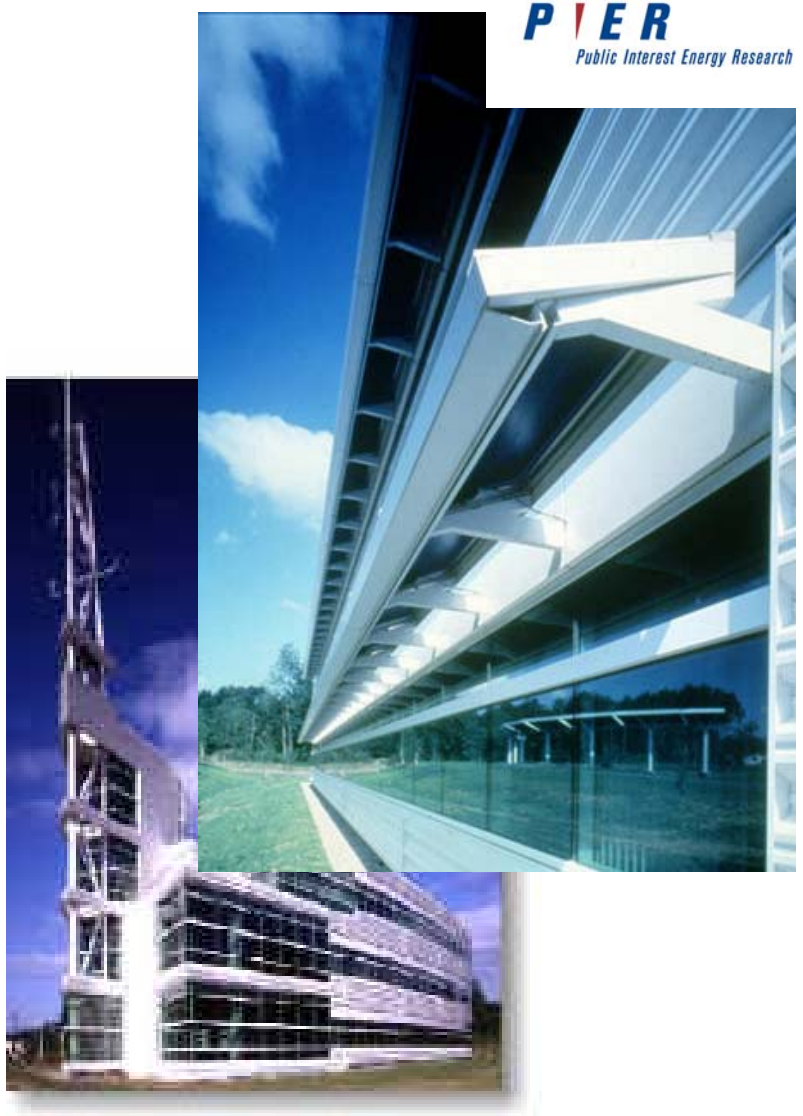


Figure 7. Sunslates manufactured by Atlantis Energy

Figure 8. PowerGuard roof tiles manufactured by PowerLight

BIPV Solicitation

- Developing PIER Renewables and Buildings RD&D Solicitation on BIPV whole building efficiency and energy production through PV's that shade and insulate.
- Industry input / DOE Workshop



http://www.energy.ca.gov/research/PIER/index.html